Tobacco

How to Raise it and . . How to Make it Pay.

By R. L. RAGLAND.

How to grow and cure—Flues and flue curing—Selections of seed—Varieties for specific types—Varietie suited for the various types—Hybridizing—Preparation of plant beds—Mulching and covering—A standing plant bed—Present status of the various leaf types in the markets—Selection of soil, &c.—Fertilizers for tobacco—Planting—Cultivating—Pruning and topping—Cut worms and bud worms—Worming and suckering—Ripening—Cutting and housing—Sun cured—Curing sweet fillers with flues—To cure mahogany color—Shipping tobacco—Curing bright yellow tobacco—The new method of curing—The science of curing yellow tobacco—Ripening of tobacco—Changes induced by flue curing—Ordering—Shipping—Packing.

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Tobacco.

BY MAJOR R. L. RAGLAND, OF HYCO, VA.

NO INDUSTRY has made greater progress in new and improved varieties, implements, fixtures, methods and management, than tobacco-planting during the past decade; and as success therein so greatly depends upon starting right and pursuing the latest improved methods and practices, the publishers sought and obtained from "the most renowned authority on tobacco culture, Major R. L. Ragland, of Hyco, Va.," a revision of his celebrated manual on tobacco, prepared specially for us at our request, that our readers may be furnished the latest, safest, and best information on tobacco culture extant.

AS A MONEY CROP.

An examination of the quotations of prices for farm products in our principal markets, taken in connection with the cost of production, satisfies us that no crop, of which the soils of the United States are capable of producing, pays such large returns as tobacco where successfully grown and of fine quality. But it is only the best grades of the various types which pay handsome returns, demonstrating the importance of making quality rather than quantity of most consideration in its production, and, therefore, the purpose of the publishers in this publication is to furnish such information in regard to the growth and management of the tobacco crop, as will insure a product of the highest quality and price.

THE BEST RESULTS COME FROM ENLIGHTENED PROGRESSIVE EFFORTS

"This is emphatically a progressive age, and he who fails to keep full abreast with the times in whatever industry he is engaged, can never expect or realize the full measure of success or honor that follows intelligent industry."—Western Tobacco Journal, Cincinnati, O.

HOW TO GROW AND CURE ALL THE TYPES.

The several types of tobacco, whether for chewing, pipe-smoking, or cigars, require different soils and management to insure a product that will command an adequate return for the labor and means expended on the crop. It is, therefore, of the highest importance that the planter should know what type his lands are

capable of producing in the greatest perfection, and the modes and management to accomplish the best results from such choice.

A deep rich soil, overlaying a red-clay subsoil, is best suited for dark, heavy shipping tobaccos.

A gravelly or sandy soil, with a red or brown subsoil, is best adapted to the production of sweet fillers and stemming tobaccos.

Alluvials and rich flats produce the best cigar stock.

Experience has proved that a gray, sandy, or slaty top-soil, with a yellow porous subsoil, is best for yellow wrappers and smokers. And these grades are in such great demand, and command so much more in price than any others, that we propose, in this short treatise, to devote to them most space; for in the production of these, the author has had most experience and success; and while the production of "brights" requires more skill and careful management, they seldom fail to make ample compensation for all the attention bestowed upon them.

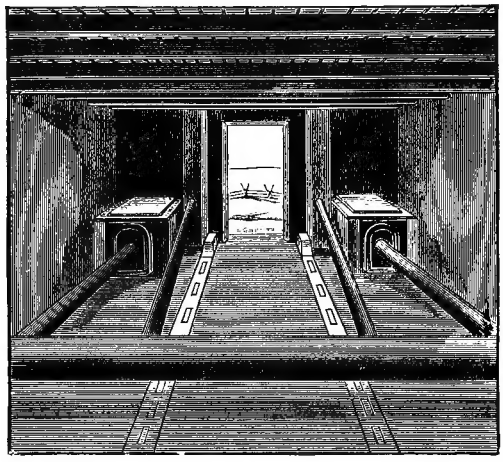
But unless the planter makes provision by building or arranging suitable barns provided with flues, or prepares charcoal, he need not expect to succeed, and had better aim at some other grade requiring less preparation, cost, and skill.

Log barns, ranging from sixteen to twenty feet square, are the sizes mostly used. These should be built about twenty feet high in the body, and covered with shingles or boards. Large logs may be used until the pen is built about seven feet high from the ground. Then if the size is twenty feet, lay off for five rooms, four feet apart, and place tier poles across to form the lower tier. Raise two logs higher all around, and put on another course of tier poles directly over the first. Then, using smaller logs (cabin size), place on three logs higher all around, laying on tier poles as before, and continue to elevate the body of the barn until you have five tiers. Then place two more logs around the plates, and the pen is ready to be roofed. You will then have a barn with five rooms and five tiers high. Mark you, the lower tiers are not firing tiers, but placed in the barn for the convenience of hoisting, and for storing cured tobacco when necessary. By this arrangement, the tiers are about three feet apart vertically, the body of the barn a cube—as high as it is wide and deep—and the whole arrangement conformable to the process of curing. The roof is so constructed, conforming to the plan of the tiers below, as to contain three tiers above the joist, varying in length. Such a barn will hold about six hundred and fifty to seven hundred sticks of medium tobacco, six plants to the stick. To prepare for curing brights, it must be chinked and daubed close inside and out.

FLUES AND FLUE-CURING.

Flues have almost entirely superseded charcoal for curing yellow tobacco, as being cheaper and better every way. The heat is more readily controlled by the use of flues—an important item in successful curing—and the tobacco cured therewith is cleaner, brighter and sweeter than that cured with charcoal. The flue is, moreover, the best mode for applying heat in the curing process for any type of tobacco requiring the application of artificial heat, and may be used to good advantage in drying out and seasoning those types cured mainly by the sun and air, and preserving them from injury. Its use is fast "superseding the open wood fire with its objectionable smoke," as predicted by the writer years ago.

The following cut represents the "Furnace and Pipe" flue, more extensively used at this time than any other, and is not patented. It is cheap and reliable, easily controlled, safe, and may be relied upon to work well.



Flue Curing.

Cut out two or three logs from the end of the barn as represented by the brick work. Then first construct the two furnaces with brick or stone, as follows: Let the mouths of the furnaces project fifteen inches outward beyond the wall, and extend the furnaces about five and a half to six feet. The outer wall of the furnaces should be about fifteen inches distant from the logs or sills of the barn. Build the walls of the furnaces eighteen inches apart and eighteen inches high, running back to fourteen inches high, and let the bottom of the flues slope upward from four to five inches. The furnaces should be arched with brick or covered with fire-proof stone, or No. 16 or 18 sheet iron.

Be careful to see that the furnaces at every point are so constructed as not to come in near contact with the sides or walls of the barn, lateral or vertical, and that the exits of the pipe are protected by brick or stone, as seen in the diagram.

Insert sheet-iron pipes on cast-iron eyes made for the purpose and placed into the ends of the furnaces, as near the tops thereof as possible. The eyes are not absolutely necessary, but they greatly protect the pipe from burning, and being fixed into the ends of the furnaces, the pipe is more readily adjusted. For a 20 by 20 feet barn use pipe eleven or twelve inches in diameter; for barn 16 by 16 feet use ten-inch pipe. Extend the pipe all around, with a gradual elevation of one foot rise, and with two feet elevation. Cap the ends of the pipes with an elbow.

For small barns, the pipes may be brought together midway, by a V-shaped connection into one twelve-inch return pipe, through the middle of the barn. This flue operates well, and is very popular with the planters working a small force and using only small barns, which are better for them than large ones, and is the cheapest good flue made.

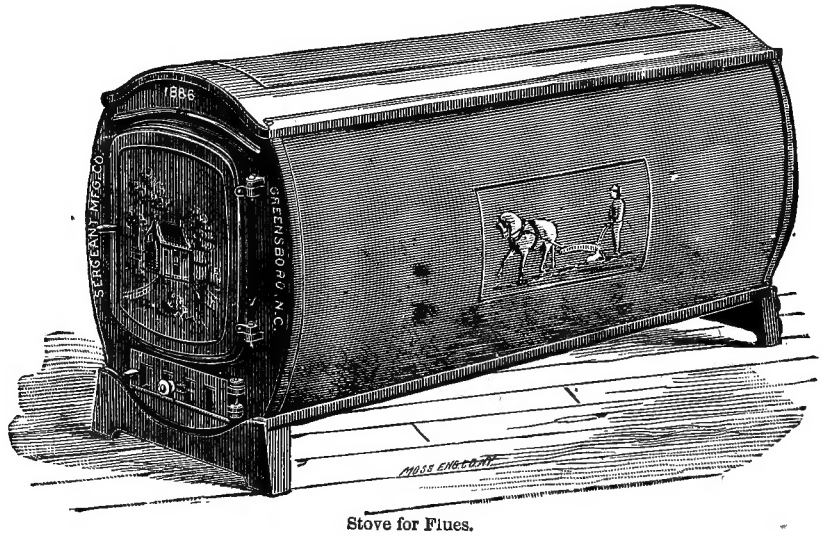
Any tinner can make the pipe, and foundries and hardware stores furnish the eyes. The cost of pipe varies from five and a half to six and a half cents per pound, and ten-inch cast eyes cost about two dollars a pair, and twelve-inch eyes

about two dollars and fifty cents. The cost of piping for a small barn varies from eight to ten dollars, or less.

Patented flues cost more, and some of them are well worth the difference in the cost over the plain flue. The "Regulator" is one of the best, and costs very little more, and as a fuel-saver alone will more than compensate for difference in cost in one season's curing. By the use of this flue the heat is more easily under the control of the curer—the temperature being regulated at will by throwing the heat into or out of the barn. The "Regulator" is manufactured at South Boston, Va., by Jordan & Easley.

SELECTION OF SEED.

There is no farm crop grown as a staple in the United States that pays better than "good" tobacco; and to grow good tobacco requires, in the first place, good seed; for good seed is at the foundation of all successful farming; and more essential, if possible, as regards tobacco, than in any other crop. For in this, the range of types, grades, and prices, are wider than in any other crop, while the seed affect



Stove for Flues.

and control all these more than any other factor. Soil, climate, and management, next to variety, operate to determine the character of the product.

The variety must be suited to the type which the planter intends to raise, and the soil must be adapted to the type, or failure is certain. Bright yellow tobacco cannot be produced on dark rich soil, nor rich dark "shipping" on poor gray soil; nor will the rich, coarse varieties produce fine silky yellow goods, or the thin silky varieties make heavy, fat, tough export tobaccos.

There has been a wonderful improvement in varieties of tobacco during the past generation—improvement by selection in the old kinds and the introduction of new varieties, with superior qualities and characteristics for every type of tobacco. None but an old fogy will continue to plant the old, unimproved varieties because they were his father's or grandfather's favorites. The world moves, seeds are improved, and industries developed and advanced. Our ancestors suc-

ceeded with the varieties of tobacco they planted, when there was mainly but one type—the dark shipping—but taste and fashion change, new types are wanted and new varieties suited to these types, and planters who meet the demand are those who make the most money by tobacco planting.

Where is the successful farmer who now sows the old wheats once used by his ancestors? Look at the improvement in varieties in vegetables, fruits, farm and horticultural, in the past century. Seeds, like animals, are greatly improved by propagation of selections and judicious crossing; and especially is this true as regards the improvement of seeds, when carried on under the most favoring conditions of development as to soil, climate, and cultivation. Virginia is the home of the tobacco plant, and here it develops to the highest perfection, and, consequently, here have originated the best and finest varieties. She grows now all the types used in plug tobacco and for pipes and cigarettes; and she has some sixteen hundred square miles of soil suited to another type—cigar tobacco—and these soils lie mainly in the Piedmont country, where our people are striving to compete with the West in growing grain. Here is an opportunity that ought to be improved.

It is a recognized fact that where any flora develops to greatest perfection, there is where the "best" seed can be grown. It would pay planters in the South and West, who grow the yellow and dark export types, to get their seeds every year from Virginia, as market gardeners get seeds from localities where the several varieties develop to greatest perfection, rather than grow their supplies at lower cost, but under less favoring conditions, as to adaptability of soil, climate, &c. They know where to get the best, and are aware of the tendency to degeneration in seeds generally, and the importance of "a frequent recurrence to first principles," to promote healthy normal growth and maturity.

Planters have no excuse for using poor seeds when pedigree seeds of all types may be so cheaply procured. The cost of tobacco seed per acre ranges from ten to twenty cents—the cost of seed of no other farm crop is so little.

VARIETIES FOR SPECIFIC TYPES.

We will premise by stating that only an approximate guide may be given for the selection of varieties suited to the several types. The variation in soil and climate in different localities greatly modify the selection. For what is best in some localities is not best in others; and trial, at last, must determine what is best in every case. When this is found, it is well to stick to it and plant mainly of this variety, and sparingly of others until a better is found, if possible.

VARIETIES SUITED FOR THE VARIOUS TYPES.

For dark, rich "shipping," nothing has been found superior to the following: James River Blue Pryor, Lacks or Beat-All and Medley Pryor.

For sweet fillers: Sweet Oronoko and Flanagan.

For stemming: Long Leaf and Broad Leaf Gooch, Hester, Tuckahoe, Big Oronoko, and Lacks.

For mahogany wrappers: Tuckahoe, Sweet Oronoko, Flanagan, Primus, Long Leaf Gooch, and White Stem.

For cutters: Hyco, White-stem Oronoko, Yellow Oronoko, Granville Yellow, Sterling, Lacks, Yellow Pryor, and Hester.

For yellow wrappers and fillers: Sterling, Primus, Granville Yellow, White-stem Oronoko, Tuckahoe, Hester, Long Leaf Gooch, Yellow Oronoko and Yellow Pryor.

Trial will determine what variety is best for any locality, as no one variety is best for all locations. To plant varieties unsuited to the type, or on soils unadapted thereto, is to invite failure every time.

The leading cigar varieties are: Connecticut and Pennsylvania Seed Leaf, Imported and American Grown Havana, and several Spanish Strains.

In localities liable to early frost it is safest to plant the earliest varieties of the several types, such as Sterling, Primus, Granville Yellow, Hyco, Hester, Sweet Oronoko and Bradley for the manufacturing types, and Havana, Big Havana, and Persian Rose for cigars.

White Burley, when grown on rich limestone soil, makes a mild type of tobacco in great favor, but this type cannot be successfully produced on silicious soils, such as are best adapted to all other leaf types; and for this reason, it has invariably proved a failure in the old leaf producing States east. Southern Ohio and eastern Kentucky produce the best grade of this type.

Sweet Oronoko—the Eastern Burley—makes mild, sweet substantial chewing and smoking goods, unexcelled by Burley or any other type, when properly grown on silicious soils.

Hyco and Lacks cure readily and more certainly of colors desired in types for which they are recommended.

Hester and Long Leaf Gooch possess greater adaptability to soils than any others, and therefore succeed where others fail.

Sterling, Yellow Oronoko and Yellow Pryor are unexcelled for producing the finest Lemon Yellow goods, while Long Leaf Gooch, Tuckahoe and Hester make the finest Orange Yellow.

Bradley makes fine manufacturing and good cigars.

Big Havana is the best Americanized Havana, and Persian Rose, the earliest cigar leaf, is one of the most promising foreign varieties.

HYBRIDIZING.

New and superior varieties are being constantly originated through hybridization, and that planters may be enabled to develop and test them, the following instructions are given to aid them in efforts in this line:

The bloom of the tobacco plant (see Fig. No. 2) has a monopetalous in fine dibula-formed corolla, i. e., the petals are joined as one in a funnel-formed corolla; within which are fine stamens (the male organs of the flower) adhering thereto and surrounding the pistil (the female organ), which terminates in the ovary below the nascent capsule, where the seeds are formed. The end of the stamens are capped with anthers which secrete the pollen or fecundating dust, which is taken up by the stigma, the vascular upper end of the pistil, and thus fecundation is effected.

THE MODUS OPERANDI OF HYBRIDIZING OR CROSS-FERTILIZING VARIETIES.

If the pistils of the Oronoko variety are fecundated with pollen from stamens of the Pryor, the cross is a hybrid-Pryor on Oronoko, and vice versa when the pistils of the Pryor are fecundated with pollen from the Oronoko, the hybrid is an Oronoko on Pryor.

To accomplish such crosses readily, it is necessary to select blooms at the stage of inflorescence just before the corallae open; then carefully open the tube, say of the Oronoko, with a small sharp-pointed pen knife, carefully remove the stamens, then take stamens from say the Pryor bloom just before it opens naturally, and insert these Pryor stamens into the corolla of the Oronoko and around the stigma thereof, and from which its own stamens had been removed, thus fertilizing the stigmas of the Oronoko with pollen dust of the Pryor stamens, and thereby producing a cross or hybrid Oronoko and Pryor. By the above-described mode, crosses of any varieties of the species nicotiana tabacum may be effected, and by any planter of intelligence, if directions are followed.

NATURAL DEVELOPMENT AND CAREFUL PROPAGATION.

Some of our best varieties are accidental crosses produced by insects carrying the pollen from the bloom of one variety into that of another. Some again are developed by careful selection long continued with reference toward increasing certain desirable qualities—perpetuating and increasing the good points and "breeding out" the objectionable ones—until the highly developed plants became a new variety, sui generis, as are some of our most popular and desirable ones now in use.

The top flowers alone ought to be crossed upon, the lower or sucker branches being removed as soon as the plant is selected for a seed plant, and then opening them in the order of their maturity, or just as they show signs of opening naturally. If the flower is allowed to open naturally self-fertilization is apt to take place before the stamens can be extracted artificially.

The following cuts represent the tobacco flower in all the stages of its growth from the green bud to the fully ripened seed capsule.

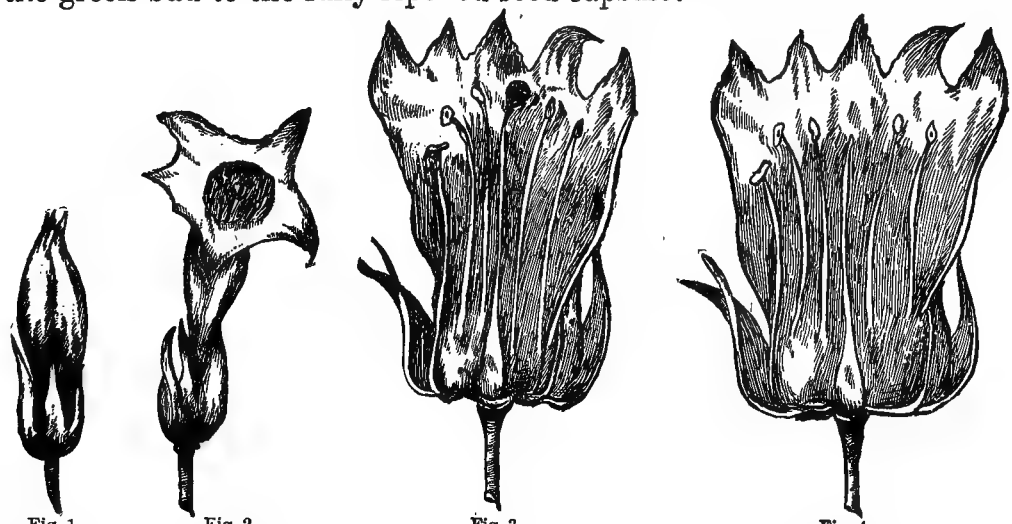


Fig. 1. Fig. 2. Fig. 3. Fig. 4.

Fig. 1 represents the bud of the tobacco plant, natural size.

Fig. 2 represents the flower and all the organs male and female, complete and natural size.

Fig. 3 represents the flower magnified, with all the organs male and female, stamens and stigma, complete.

Fig. 4 represents the flower magnified, showing the male organs or stamens complete, and the stigma or female organs clipped off by tweezers.

Fig. 5.

Fig. 6. Fig. 7.

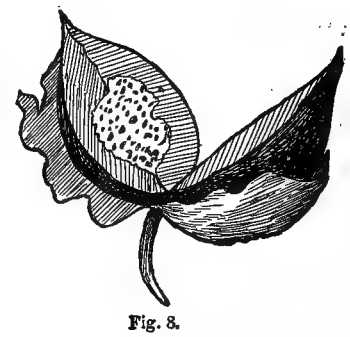


Fig. 8.

Fig. 5 represents the flower magnified, showing the female organs or stigma only, with the male organs or stamens clipped off by tweezers.

Fig. 6 represents the seed capsule, natural size, in the green state, just as it reaches the maximum of its growth.

Fig. 7 represents the seed capsule in its dry or cured condition, ready for cutting from the main stem of the plant, to be hung up in a dry room for preservation.

Fig. 8 represents the capsule broken open with seed exposed, ready for the plant-bed.

For the guidance of the planter we give the definitions, or nomenclature of the essential organs of the tobacco plant, as a more intelligent guide to crossing varieties. Stigma, the upper extremity of the pistil, or that part which receives the pollen; pistil, the central organ of the flower, consisting of the ovary, stylus and stigma; style or stylus, the stalk or elongation of the ovarium which supports the stigma; ovary, the organ containing the female ova, or in which impregnation is performed, the hollow case enclosing the ovules or young seed; stamen, the male apparatus or fertilizing organ of the flower, consisting of filaments, anther and pollen; filaments, the fine threads of which the nerves, skin and flesh are composed; anther, that part of the flower containing the pollen or fertilizing dust by which the seed-vessel is fructified; pollen, the powder or pulverulent substance contained in and on the anther of the flower; capsule, the woody seed-vessel of the plant.

[Note.—The publishers take pleasure in stating that the tobacco seed raised by Major R. L. Ragland, of Hyco, Va., have won a deservedly high and exten ive reputation, both at home and abroad, as the best for all the distinctive types grown in the United States. They are grown on scientific principles and by the latest improved methods, and have received the endorsation and recommendation of the Tobacco Associations of Virginia and North Carolina.]

Of the multitude of certificates recommending Major Ragland's seed we select only one, which is instructive, and covers the ground completely:

"We assume that you have secured seed of absolute purity and with as much care as you select for other crops. By far too little attention has been paid to this. You can no more gather grapes from thorns or figs from thistles than you can get good tobacco from impure or imperfect seed. It is a mistake to think it economy to buy or borrow from your neighbor whatever he has, simply because it is called tobacco seed. The raising of seed is as much a business by itself as is any other branch of agriculture. The proof of this is found in the results

obtained by those who have used seeds grown for market at such places as the Ragland Seed Farm, Hyco, Va. Due regard should be had as well to the nature of the soil as to the type of tobacco desired."—W. H. Snow, High Point, N. C.

The scope of this work does not permit us to enter further into this subject, but full information as to the varieties of seeds adapted to the several types can be obtained from Major Ragland as above.

PREPARATION OF PLANT BEDS.

There are two modes for raising plants—in hot bed or cold frame, or in the open air; one or the other of which has preference according to locality—the former being more practiced north of forty degrees latitude, while the latter is preferred south of that line. We will here give both, that planters may choose.

For a hot bed, select a southern or southeastern exposure, sheltered on the north, dig and shovel out a space five by twelve feet or any required length, to the depth of eighteen inches. Place straw to the depth of three or four inches in the bottom of this trench, and cover with fresh unrotted manure from the stable to the depth of six or eight inches; then cover the manure with soil (woods mould is best) five inches deep. How to cover the bed with canvas will be presently described.

Tobacco seed is sown on the bed thus prepared at the rate of two teaspoonfuls to a bed five by twelve feet. To sow regularly, mix the seed with a fertilizer, ashes, or plaster, and sow in drills three inches apart. When the plants have pretty well covered the surface of the bed, remove the canvas during the day, and only replace it when there is danger of frost, or to keep off the flea-bugs. There is the advantage of having earlier plants by this mode and perfect security against the flea-bug, which will repay for the additional cost of raising at least a portion of the plants needed for the crop by this safe mode.

But there is no question that open air beds are cheapest. And where this mode of raising plants is practicable, it is greatly to be preferred for the main supply of plants. It is the well-established opinion that plants raised in the open air stand transplanting better and usually grow off quicker than plants raised in hot bed or cold frame.

On the selection of a proper locality for a plant bed, and its preparation largely depends the timely supply of strong, healthy plants, without which it is impossible to raise a crop of fine grade. The planter, therefore, cannot be too careful in choosing a sheltered spot, neither too wet nor too dry, as rich naturally as can be found, and located so as to possess different degrees of moisture.

Go into the woods—original forest, if possible—and select a spot near a branch or stream of water, embracing both hill-side and flat, and having a southern or southeastern exposure, protected by woods on the north. Burn over the plat intended for plants, either by the old or new method. The first consists in placing down a bed of wood on small skids three to four feet apart on the ground well cleared and raked. Then fire this bed of wood and permit it to remain burning long enough to cook the soil brown for half an inch deep. With hooks, or old hoes fastened to long poles, pull the burning mass of brands a distance of four and one-half or five feet, throw on brush and wood, and continue burning and moving the fire until the bed is burned over. Never burn when the

land is wet. It will require from one and one-half to two hours to cook the soil properly.

Or, better still: Rake over nicely the plat to be burned, then place down poles from two to four inches in diameter, three and one-half to four feet apart, over the entire surface to be burned. Then place brush thickly over the plat and weight down with wood, over which throw leaves, trash or other combustible material; over this sprinkle kerosene oil, and set the whole on fire and burn at one operation.

But any mode of burning the plat will suffice, provided that it is effectually done. After the plat has been burned and has cooled, rake off the large coals and brands, but let the ashes remain, as they are essentially a first-class manure. Then coulter over the plat deeply, or break with grub-hoes, and make fine the soil by repeated chopping and raking, observing not to bring the subsoil to the surface, and remove all roots and tufts. Manure from the stable, hog-pen or poultry house, or some reliable commercial fertilizer, should be chopped into and thoroughly incorporated with the soil while preparing the bed to be sown. Experience has demonstrated that it is better to use both.

A good tobacco fertilizer mixed with equal quantity of poultry-house droppings and thoroughly incorporated, makes a most excellent manure for plants, and so does a compost made with selected chemicals, stable manure and rich moist earth. The latter when composted in time is the best and surest. But beware of using manure containing grass seed. The judgment of the planter must guide him in the amount of fertilizing material to be applied at this stage; but it is well to remind him that the tobacco plant rarely responds to homœpathic doses of plant food, but that the allopathic usage suits it best.

This plate illustrates the sowing, treading and trenching of a plant-bed in the forest—the favorite location—where there is less danger of injury to the plants by the flea-beetle, and where beds hold out longer during drought and furnish a larger supply of plants. The treading is greatly enjoyed by the young of the colored population, who sing and dance, "cut shines," as they prance over the surface to firm the soil and thereby hasten germination of the seed. Under the slave regime it was the custom to strike up a jig or corn-husking song as the work progressed, the old joining the young in both song and dance as the excitement increased, thereby winding up the job in a regular jollification.

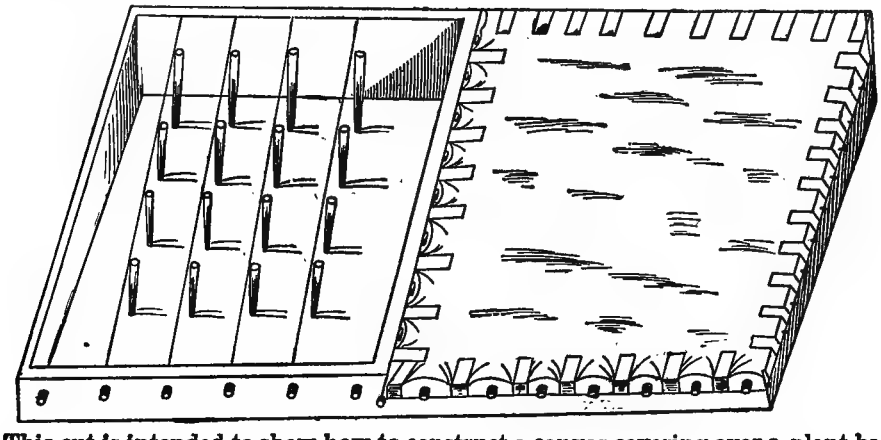
Sow at the rate of a tablespoonful of seed, which is about half an ounce, on every fifty square yards at first sowing, and later resow with a heaping teaspoon-

ful over the same surface, to secure a good stand. Injury by frosts or bugs may require a third or fourth sowing. Sow a little thick rather than too thin to meet contingencies, and secure a good stand in time.

The best way to sow the seed is to mix them thoroughly with a fertilizer or dry ashes, and sow once regularly over the bed, reserving seed enough to cross-sow to promote regularity. The tobacco seed is the smallest of all farm seeds, and consequently requires a light covering. If the seed are sown before the 20th of February, the best way is to firm the surface of the bed by treading it over closely, but if sown later, sweep lightly over with a brush or light rake. Then run surface drains through the bed, with inclination enough to pass off the water. To do this properly, run them off four or five feet apart with the foot, then open with a narrow grubbing-hoe to the depth of three or four inches. Then trench deeply around the outside of the bed, to ward off surface water and prevent washing.

Mulching and Covering.—Hog hair whipped fine and scattered over the bed attracts and retains moisture, protects the plants from frost, and acts as a manure. There is no better covering for a plant bed, but unfortunately it is rarely ever in full supply. Fine brush should be placed thickly over the bed, or, if not handy, cover with straw or chaff free from grain. A covering of some such material is necessary, or the young plants are likely to be killed by frost or suffer from drought, and they thrive better with some protection.

Canvas Covering for Plant Beds.—A covering of thin cloth has been found to hasten the growth of plants and protect them from freezing and injury by the flea-bugs. This makes the bed warmer, and acts as a cold-frame, the canvas taking the place of glass.



This cut is intended to show how to construct a canvas covering over a plant-bed.

First, boards should be placed all around the bed close, so as to prevent the little black beetle, or flea, from creeping through, eighteen or twenty inches high on the upper side and sloping to ten or twelve inches on the lower. Then prepare a lot of small stakes (small round poles, one and one half inches in diameter, make good ones), sawed into lengths graduated from two feet to eighteen inches long, and sharpened at one end. Drive these stakes six feet apart, in rows, through the bed for the laths, two inches wide and one inch thick, to rest upon. The middle lath should be a plank one inch thick and six inches wide. Then drive

ten-penny nails, eighteen inches apart, all around the outside of the boarding, and from five to six inches from the top edge. Also drive nails in the middle board, eighteen inches apart. Make the covering in two pieces, each the size of half the bed—say ten by ten yards—and sew on the outer edge, all around each cover, loops of cloth, made of common domestic, eighteen inches apart, to receive a cord or twine, which runs through loops all around and tie, and the cover is ready to be placed over the bed and fastened by pulling the twine or cord over the nails all around, letting the two covers meet in the middle over the six-inch board. By this arrangement the cover is kept fast over the bed at the right distance above the plants, and may be removed and placed over it at will in less time than by any other known contrivance.

A Standing Plant-Bed.—Every planter ought to have a standing plant-bed, which may be secured in the following way: Some time in July or August select one of the best of the old plant-beds, and with hoes shave down the green plants over its entire surface, and cover over thickly with straw or leaves, then place green brush thickly over the bed and weight down with wood. When the whole is dry, some time in the late fall or early winter, set on fire, and thus reburn over the bed. Then chop and rake fine, sow and trench as when first prepared. Repeat the same operation every year, and, if the bed is manured properly, it will improve and prove a stand-by for many years.

Unburned Beds.—Plants may be raised by going into the forest, selecting a moist rich plat, and after raking off the leaves, coultering or chopping the surface fine, manuring heavily, and sowing the seed. But such beds rarely hold out well if the season be dry. They never "repeat" well after the first "drawing" like burnt beds, which are more reliable for a successive supply of plants as the season advances.

Time of Sowin Seed.—The time for sowing varies with the latitude, variety, and season. Between the parallels of 35 and 40 degrees north latitude, compassing the great tobacco belt, beds may be sown any time between the 1st of January and 20th of March, and the sooner the better for bright grades, which ought to be planted early to mature, ripen and yellow, preparatory to being cured early in the fall, when the most successful curings are usually made. Yellow tobacco ought to be planted out in May, but June plantings usually do best in heavy dark grades. The planter will consult his interest by sowing at a proper time to suit the grade he desires to raise. Plants set out after the 10th of July rarely pay for growing and handling, and if not planted by that time, it will be wise to plant the hills in peas, potatoes, or something else.

Hastening the Growth of Plants.—As soon as the plants become "square"—i.e., have four leaves—you may begin to force their growth, if necessary. Nothing is better at this stage of their growth than to apply dry stable manure, rubbed fine, and sowed over the bed, applying at the rate of five bushels to every one hundred square yards. Be sure to have it dry and fine, and apply when the plants are dry. This is a favorable time to apply a good fertilizer, and the best time to apply it is during a shower, or when it is apparent that one is impending. Every planter should compost in time stable manure free from grass seeds along with prepared chemicals suited to tobacco, using just enough moist rich earth to promote fermentation. Nothing is better than this compost for a top dressing on plants to promote rapid, vigorous, stocky growth, defying the ravages of the flea-beetle and hastening their preparation for transplanting.

Look Out for the "Flea-Bug."—If the "fly," as it is called, begins to devour the young plants, apply plaster, in which rags saturated with kerosene oil have lain for a few hours, covering the plants with the plaster, if necessary, to keep the little pests from devouring them. Repeat the application after every rain unless the flies have left.

A covering of green cedar brush has driven off the fly when other remedies failed, and saved the plants. If the flies are numerous, the planter can save his plants only by vigilant and constant attention. Hard burning, early and thick sowing, liberal and frequent applications of manure, are the best safeguards, which rarely fail to reward the planter with an early and full supply of stocky plants, and with some left for his less provident neighbors. Some planters, if such they may be called, always fail—some never. Follow the latter, and you will always be right.

Canvas-covered beds are the surest protection, and seem the best every way.

IMPORTANT.

At the risk of repetition, but to make plain further instruction on a branch of the subject about which beginners are less informed and most need advice, the author adds what follows:

PRESENT STATUS OF THE VARIOUS LEAF TYPES IN THE MARKETS—FUTURE PROSPECTS, ETC.

The dark export type is dull, and excepting the best grades, is selling below the cost of production, and consequently offers no inducement to planters to raise the type, except a few in Southside Virginia, and portions of Kentucky and Tennessee, where soils are peculiarly adapted to this and unsuited for other types. Planters in North Carolina and Piedmont Virginia will do well to let this type severely alone and grow only the manufacturing types—and of these mainly the bright yellow, for which their lands are peculiarly adapted. Portions of the Piedmont section in Virginia and North Carolina can successfully produce a rich mahogany, which is always in demand at remunerative prices.

The mahogany type is usually grown on soil somewhat too rich for the finest brights, and the fact that the leaves grown upon rich soil possess more substance (cellular tissue, oil, and gum,) is the main reason why they cannot be cured with higher color. Where the soil is well adapted to this type, it is profitable, because it usually commands a high price, and its product is from 25 to 33 per cent. more than bright yellow.

The sweet sun-cured type is usually produced on soils similar in characteristics to those which produce the mahogany type, and when there is a failure to catch and fix the mahogany color by flues, a nice red color similar to sun-cured is obtained by running slow fires in the flues, and thus making a nice sweet filler almost as good as tobacco cured entirely by sun and air. But the usual mode now practiced by the most successful producers of the sun-cured type, is to place the tobacco on scaffolds, so soon as cut, near the barn, and permit the leaves to cure by sun and air, if the weather permits, and then remove the tobacco into the barn and apply slow fires in the flues to dry out thoroughly stems and stalks.

A sweet sun and air cured filler is always in demand at paying prices, and a taste once acquired for this type will usually reject all others as inferior. In fine,

for plug and fine-cut chewing, nothing surpasses the "old favorite." The reason for this is that thoroughly ripe tobacco mellows in the sun and under a low artificial heat in curing, develops sugar in the leaves, which is fixed before vinous fermentation takes place, and the vegetable oils are retained to improve the aroma and taste.

VARIETIES SUITED TO TYPES.

It is of prime consideration to select varieties adapted to the type sought to be produced. Those which develop with a coarse thick fibre and hold the largest percentage of gum and oil are the kinds which make the heaviest and waxiest shipping. Mahoganies require a large well-shaped leaf, closer and more elastic fibre, less gum but more oil. Brights must grow rapidly and ripen early, possess silky fibre and less gum and oil than the aforementioned types. But variety, soil, manuring and cultivation all affect more or less the staple through the cellular tissues of the leaves, while the mode of curing determines the color and to some extent the quality, which governs the price.

THE BRIGHT YELLOW TYPE.

Choose a gray gneiss soil, sandy or slaty, dry and overlaying a porous sub soil—the very opposite to a close, soggy wet soil; for tobacco will not flourish with wet feet, nor will the plants yellow as they ripen on a cold impervious clay soil. Discard all lands unadapted to this important crop, and what is of more consequence still, experiment on a small scale in testing such as are most likely to produce this type of the finest quality. It is useless to test a spouty, black gravelly soil, which should always be avoided, or one which is known to cause "frenching," wallowing, or other abnormal worthless growth, or on which tobacco is liable to fire, spot, or develop frog-eye, for it very rarely ever pays to plant such soils in any type. An experienced planter will rarely err in selection, but sometimes nothing short of trial will definitely determine adaptation of soil or variety for the several types.

The most prolific cause of failure results from inexperience in not knowing how to prepare for raising tobacco, in constructing suitable barns, and in the lack of skill in curing. Next to these come improper selection of land and varieties unsuited to soil or type aimed to be produced; the variety must be adapted to soil and type, or full success is impossible.

It is nevertheless true that during some seasons a pretty fair quality of tobacco is produced on soils not adapted to tobacco, and by the use of varieties unsuited for the type raised, but such are exceptional cases, for never can extra fine crops result from such mismanagement. It will always pay planters to select with reference to the adaptation of both soil to type and the right variety for both. Improper and defective cultivation also operates against successful tobacco planting, but the latter is often the secondary consideration in comparison with other mismanagement alluded to above.

Possibly the most discouraging of all the failures results from the want of skill in curing, which comes mainly through practice. It will pay any unskilled planter to have his fine yellow tobacco cured by an expert; for it is a pity to spoil a barn of tobacco by curing it up green or black, when it might so easily have been cured of the desired color by one who understands the effects of heat in fixing the color, and how to so regulate the same as to procure the desired end.

OTHER IMPORTANT CONSIDERATIONS.

Some varieties are far more easily cured yellow than others, but no fixed rule can be given for regulating the degrees of temperature to fix the color, during the curing process, in consequence of the variable condition of the material operated upon, which variations are caused by differences in soil, climate, variety, weather, and season. Therefore, the curer must at last rely mainly upon his judgment in regulating the temperature so as to make a successful cure. During some years (such as 1889 proved to be up to 9th of September) all tobacco planted on gray lands well drained and in some one or other of the reliable yellow varieties cured yellow readily when heat was applied. In fact, it was almost impossible for any one, with even a modicum of experience and common sense, to fail in curing the desired color. But that portion of the crop ripening after the 10th September required far more skill to yellow and cure successfully, and the reason for the change was in the changed condition of the tobacco.

It would extend this branch of the subject much beyond prescribed limits to explain the rationale of a super-abundance or lack of sap in the leaves, more or less oil and gum, and how these affect the color under the application of hot, dry or moist air during the critical process of curing. But it is becoming plain to most planters with more or less experience, that success in curing is oftenest obtained for ripe plants of the earliest plantings grown from the earliest varieties.

It is notorious that green plants will not yellow properly, nor will the utmost skill in curing fix and retain the desired color in immature tobacco. Warm, calm weather greatly aids in curing successfully. Therefore, it is important to plant such kinds as possess fine texture, grow rapidly and mature early, when the weather conditions are most favorable to curing the finest and brightest goods.

GENERAL INSTRUCTIONS WHICH APPLY TO ALL THE TYPES.

The foregoing, in relation to raising plants and what follows, under the headings, Preparation of the Soil, Manuring, Planting, Cultivating, Pruning (called "Priming"), Topping, Worming, and Suckering, apply substantially to all the types up to the stage of harvesting when different methods become necessary, which are specified under each type.

SELECTION OF SOIL, PREPARATION AND MANURING.

The tobacco plant thrives best in a deep, mellow, loamy soil, rich or made so with fertilizers. The subsoil ought to be sufficiently porous to permit the water falling on the surface to pass downward readily, and not to accumulate to drown and stagnate.

If old land is selected, it ought to be fallowed deep in the fall or early winter, that the frosts may pulverize it. Turn under, if possible, some coarse farm manure, for its decay will greatly help to loosen the soil, while furnishing food for the crop. As a coarse manure for yellow tobacco, nothing is better than wheat straw turned under in the fall and winter. The plants rarely fail to ripen yellow in color on land thus treated.

In the early spring more manure may be applied, but it is better that this should come from the compost heap. Follow the application of the compost with one-horse turning plows, crossing the previous ploughing, turning not exceeding four or five inches deep—about half the depth of the first ploughing. Then, just before it is time to plant, run double-shovel ploughs over the lot, crossing the previous furrows, and follow with harrow or drag, crossing again to thoroughly make fine. These repeated ploughings, crossing each time every previous one, never fail, if the work is done when the land is in proper condition, to put it in proper tilth.

Let the planter remember that "a good preparation is half cultivation," and not stop until the land is in proper condition.

In preparing land for tobacco, be sure you don't plant varieties unsuited to the soil or type, else failure is inevitable. The cause of so much mean, nondescript goods on the markets every year is mainly attributable to failure in planting the proper varieties on the right kind of soil, and planters should carefully note this and sow seed suited both to soil and type.

If any one knows of a better way, then let him pursue it—the writer knows of none better. And just here it may be well to state that perfection is not claimed for any mode or practice recommended in this book, but only the best methods known to the author are given, for guidance to the uninitiated. We live and learn, but life is too short to learn every good thing by experience unaided. Every man owes something to those who are to come after him; to freely give as he has freely received.

But the author is not writing for those who know more than he does—and doubtless there are very many—but for beginners, and those having but little experience in tobacco culture. He gives no advice which he has not followed in his own work, and recommends nothing which experience has not commended as the best in theory tested by practice. Those who possess a better knowledge of the subject, and whose practice is verified by results, ought by all means to give the public the benefit of their knowledge and experience. Planters will gladly welcome their teaching, and honor them for their service.

But, to return, having put the land in nice "order," lay off the rows with a shovel plough, three feet three inches apart, and follow, drilling along the furrow a good fertilizer at the rate of some two hundred and fifty to four hundred pounds per acre, according to the natural strength of the soil and the quantity of manure previously applied; then follow with one-horse turning plows, lapping four furrows on the fertilized trench, and when finished in this manner your lot is ready to be planted, when the beds have been "patted" with hoes, with "pats" two feet ten inches apart, to mark points for setting the plants. In the older portions of the fine yellow tobacco country the applications are becoming heavier from year to year, some planters using as much as six hundred pounds to the acre.

New ground, or old field that has grown up and been cut down, will require different preparation from old smooth land. But on the former our best brights are raised. Any preparation that will put the soil in fine condition, clear of roots, tufts and trash, is all that is required. Experience teaches that if land is cut down two or three years previous to its being prepared for tobacco, it greatly facilitates the preparation and helps its fertility. Much of the vegetable material, both in and upon the soil rots, the roots break easily, and the soil is altogether lighter and finer.

While it is economy to dispense with the hand-hoe in making hills on old land—the plow doing all the work, as it ought, when it can be well done—yet on stumpy, rooty, and rough land the hoe is indispensable in the preparation of a hill, as it should be made to receive the plant. But before the hills are made, it may be well, unless the soil is naturally rich—and such is not often the case with soils best adapted to yellow tobacco—to apply some fertilizing material to hasten forward the plants, and mature them properly and early. Here commercial fertilizers have done, and are doing, their best work. Bulky, coarse manures often do more harm than good on new and puffy soils. The smaller the bulk, and the more concentrated the fertilizing elements, the more readily they are appropriated and assimilated by the plants, if of the right material, and in the most available form. Nitrogen, phosphoric acid, potash, lime, and soda are most necessary for the tobacco plant; and a fertilizer which supplies the relative quantity of each, and from the proper sources, will never fail to show good effects therefrom if the rainfall is sufficient to quicken their action.

Most of the soils best adapted to the finest types of tobacco, especially bright and sweet fillers, are thin and poor, and need plant food to push the plants forward, and rapidly, in growth and maturity, so that the product may be ripened and mellowed of yellow color, preparatory to being housed and cured.

FERTILIZERS FOR TOBACCO.

"While chemical analysis defines the composition of plants, it does not define proper feeding, either in the proportions or forms best suited to the crop." Tobacco is grown for its leaf crop; not the largest product, however, that can be grown on the soil, but such as possess fine elastic texture, color, and other desirable qualities, according to type.

In a crop like tobacco, where the commercial value is largely influenced by artificial conditions of development, the plant food ought to be abundant, solvent, and furnished in form and proportion, which practice has demonstrated as promotive of the best results. "It is a problem of practice, enlightened by science, and not to be figured out by science." And, moreover, one which each planter, to some extent, must determine for his soil and the type for which it is best adapted. There is no tobacco fertilizer made suited to all the types and varied soils. The "universal cure-all pill" is as inapplicable to the varied forms of disease as the universal tobacco manure for all the types and soils.

CHLORIDES OBJECTIONABLE.

Tobacco grown for its leaf product indicates that potash is applicable as a manure, but certain forms or combinations of potash are not suited therefor, since it has been clearly demonstrated that chloride of potassium ("muriate of potash") is really objectionable. For Stoner says: "The objection to chloride of potassium as a manure for tobacco depends upon the fact that leaves of this plant which have been grown upon land rich in chlorides will not burn readily when dry, apparently because the chlorides tend to prevent a certain swelling or puffing up of the ashes in the half-burned tobacco, which is favorable to bringing the particles of carbon into intimate contact with the air. Numerous experiments in proof of this peculiarity of the chlorides have been recorded."

Experiments by Nessler and Schloesing were conclusive as regards the capacity of cigars once well lighted to hold fire, being in inverse ratio to the chlorides employed in growing the tobacco of which the cigars were made. The variations running from "absolute incombustibility" of tobacco grown with chloride of calcium, to one which held fire for three minutes grown with sulphate of potash. Boussingault obtained practically similar results.

The above objection applies mainly to cigar tobacco, but chlorides also act injuriously on the texture and flavor of the leaf manufacturing types, and therefore planters should scrupulously avoid using fertilizers containing chlorides in any form; for it stands to reason, aside from experience, that a manure which "hinders beet sugar from crystalizing and tends to make potatoes waxy rather than mealy," as chlorine does, can scarcely be expected to improve the texture and flavor of the tobacco leaf.

But the sulphate and nitrate of potash can be used most advantageously in manuring for any type of tobacco, and particularly on soils deficient in potash. A superabundance of potash tends to keep the tobacco plants green even while ripening, and for the yellow type thus interferes with curing the desired color.

It would serve a good purpose to require analyses made of all tobacco fertilizers to state the percentage of chlorine along with the other materials contained therein for the guidance of planters. Analyses may indicate, but do not determine, the real value of a fertilizer. The estimated commercial value of any fertilizer is based on the available percentages of phosphoric acid, nitrogen and potash contained therein; but analysis does not determine its true value, because it fails to specify the forms and quality of these constituents.

The experiment stations in the several States are engaged in a most commendable work in testing fertilizers on various crops to find out in what forms, proportions, and combinations fertilizing materials produce the best results.

"The continued use of any one manipulated fertilizer is injurious and disappointing."

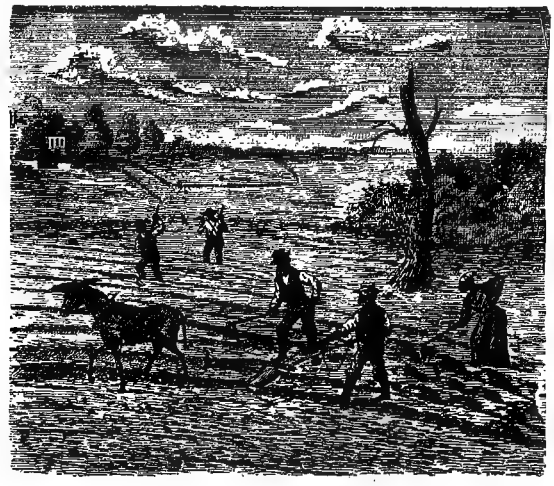
It has been plainly demonstrated that the same fertilizer used year after year under the same crop, as is done in some portions of the tobacco belt, ultimately fails to give satisfactory returns. The product not only grows less in yield, but inferior in quality, while the land seemingly gets poorer every year. This is because of the failure to furnish elements needed by both crop and soil, and of which they have been deprived, while others have been accumulating to the extent of such over-supply as to injuriously affect the crop. The soil thereby "thrown out of balance" may need possibly only one or two elements furnished to produce large crops of fine quality. A change of brands sometimes works wonders in one season, while a continued use of the same afterward leads to disappointment as before. Of the causes injuriously affecting the yield and quality of the tobacco crops during the past decade, aside from the injudicious selection of soil and varieties, none have been more potent than the wrong selection and inappropriate application of so-called tobacco fertilizers.

Extensive areas of poor gray silicious soils in the yellow belt are rendered capable of producing good crops of fine yellow tobacco, by the aid of commercial fertilizers alone, when of composition suited thereto.

Mode of Applying Fertilizers.—Planters differ in the manner of applying fertilizers, whether in the hill, drill or broadcast. That the same quantity will go

further and produce larger results the first year, for the quantity used when applied in the hill or drill, is generally conceded. But advocates of broadcasting claim that when the crop, to which the fertilizer is applied, is to be followed by another in quick succession—to be sown in wheat as soon as the tobacco is removed—then broadcasting is the best, for reasons which seem too apparent to need explanation.

Having prepared the land for hilling, apply the fertilizer by whichever mode the planter prefers, and in such quantity as the natural strength of the soil indicates, laying off the rows three feet three inches apart, and make the hills about two feet ten inches distant from centre to centre. Mark the measure on the hoe-handle and require the hillers to apply it frequently as a guide. The rows should be wider apart than the hills, to afford proper cultivation without breaking and bruising the plants at the final plowing—a matter of no small importance, as the least blemish on a fine leaf nearly destroys its value as a wrapper.



This plate illustrates the work of hilling. It is becoming common to plant on the drills instead of in hills, where thorough preparation has been made on clean soil. But it is well to chop fine that portion of the drill where the plant is intended to be set, and then pat it firm with the hoe to facilitate planting and cause the plants to root better.

Planting.—Having prepared the hills, you are ready to plant any time after the 1st of May. Planting is often most effectually done when the hills are being made in May, and the land is moist with the winter's sap, by planting in the afternoon the hills made the same day. If properly planted, very few of the plants will fail to live. Observe to draw the plants one by one from the bed, and handle so as not to bruise them. It is a waste of time and plants to set out very small plants, but wait until they are proper size—the largest leaves about two and one-half to three inches wide. Put a basket of plants in the hands of a boy or girl, who drops a plant on each hill, dropping in one or two rows, according to age or expertness. The men follow, with each a planting peg made of hard wood, six inches long, one and a quarter inch in diameter at large end, and tapering to a point. Each planter takes a "hand plant" to start with (unless the dropper has learned to drop two plants on the first hill), and pushing his planting peg some two inches into the hill, withdraws the peg, inserts the plant, and by a dexterous movement of the peg and the knuckles of the left hand, closes the dirt

gently but compactly around the roots. He then picks up the plant on the hill as he moves forward, and by the time he reaches the next hill has adjusted the plant in his hand to insert into the hole in the next hill. Thus the "hand plant" facilitates the work. Try it and you will be convinced. There is art in planting properly, as is shown in the increased number of living monuments that attest superior work. But why enter into such minute details? say some. That you may start right, shun the errors of inexperience, and practice at the start the best methods, as demonstrated by successful practice.

If the soil is dry when the hills are made, then it will require a "season" for planting. The best come with showers. It is not well to plant soon after a soaking rain, but wait until the land settles. If the plants are good, seasons favorable, and the planting well done, very few will die if transplanted before the 10th of July. After that time all is uncertainty. Hence the importance of getting a stand before that time.

After planting is over, it will be necessary to replant from time to time as seasons occur, embracing every opportunity to fill up the missing hills. If cutworms are troublesome, hunt for and destroy every one as far as possible; for it is useless to put a plant in a hill where one of these pests has taken up quarters, and expect it to live and grow.

One woman dropping the plants from a basket on the hills for two men to follow planting them.

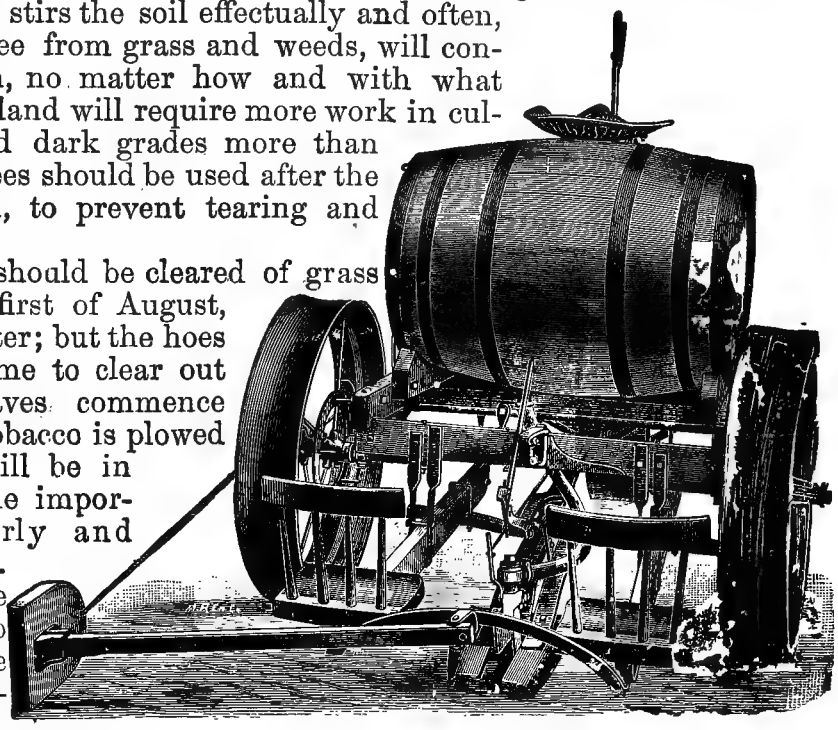
Cultivating.—It is important to commence cultivation soon after planting, to loosen the soil and start the plants growing. Just at this point many planters fail to do their duty, which no subsequent work can atone for. Early, rapid, and thorough cultivation is necessary to produce first-class tobacco. If the preparation has been thorough, thrice plowing, followed each time with a hand hoe, will suffice for the crop.

For the first plowing, no implement is better than the wing coulter, the next best the cultivator or double-shovel with the coulter points. The second plowing may be effectually done with the turning plow or cultivator; if grassy, use the first. The last plowing is most effectually done with three furrows with the single shovel—a furrow on each side, then splitting the middle with the third and last furrow.

Never "scrape down" tobacco with the hoe without putting back on the hill or bed as much dirt as is scraped down. This will prevent baking, and save many plants should a dry spell follow the hand-hoe working.

Any process which stirs the soil effectually and often, and keeps the plants free from grass and weeds, will constitute good cultivation, no matter how and with what implement done. Old land will require more work in cultivation than new, and dark grades more than bright. Short singletrees should be used after the plants are half grown, to prevent tearing and breaking the leaves.

The yellow grades should be cleared of grass and weeds before the first of August, and not plowed thereafter; but the hoes may be used at any time to clear out the crop till the leaves commence graining. The longer tobacco is plowed the later the plants will be in ripening; therefore, the importance of giving early and thorough cultivation. Any one who can raise good cabbages ought to know how to cultivate tobacco, as the cultivation is very similar Sometimes it becomes necessary to push the plants forward, where previous manuring has proved inadequate, to hasten ripening, so as to escape frost and to cure well. I would advise the use of some good standard fertilizer, applied around the plants, in quantity about 150 pounds per acre, and earth scraped upon the fertilizer around the tops of the hills as applied.



Bemis Tobacco Transplanter

PRUNING AND TOPPING.

Under this head there is wide difference of opinion. Breaking off the small and inferior leaves of the plant near the ground is called "priming," or pruning proper, which operation is done along with the "topping," if done at all. There are advantages for and against priming, but all resort to topping—plucking out the seed bud and adjacent small leaves with the thumb and finger. Some contend that pulling off the lower leaves saps the plants and retards the growth if the weather is dry. That permitting the lower leaves to remain on the stalk protects the upper ones from sand and grit, makes them cleaner, and therefore more salable. Sand and grit are the terror of the tobacco buyer. On the other hand, it is contended by some that by pulling off the lower leaves, which are generally useless, the remaining leaves receive more nutriment and contain more wax, oil, and gum, and that the lower leaves harbor worms and make the worming process more tedious.

It is best to wait until a considerable number of plants begin to button for seed before commencing to top. Topping should be the work of experienced and trusty hands—men who can top, leaving any required number of leaves on a plant without counting. The secret of this—no longer a secret to the initiated—is, that the topper soon learns to know that counting the bottom leaf and the leaf that hangs over it in the third tier going upward, make nine leaves, including both top and bottom leaves. Fixing this in his mind, the topper has only to add to or deduct from this index leaf marking nine, to leave any desired number of leaves on each plant with certainty and without counting. Young man, if you don't know how, get some old negro to show you. Topping, you will find, is a slow business if you have to count the leaves on all the plants topped. If the plants are not "primed," then the "bottom leaf" must be fixed by the eye, looking upward for the leaf in the third tier, which hangs over it, to catch the cue as before. If priming is done, don't err in pulling off too many leaves. No regular rule can be given, so the planter must judge for himself. The reason given for waiting until many plants are ready to be topped is mainly that more plants may ripen together, and be ready for the knife at the same time. This is an advantage that applies with strong force to all tobacco intended for flue curing.

The number of leaves to be left on each plant varies according to the time the work is done, early or late, the appearance and prospective development of the plant, the season, whether propitious or unfavorable, strength of the soil, and amount of fertilizing material applied. On medium soils, in ordinary seasons, the first topping should be from ten to thirteen leaves—rarely more—for brights. For sweet fillers from nine to ten, and for dark, rich shipping, from eight to nine leaves are enough. As the season advances reduce the number of leaves accordingly, remembering that quality, more than quantity, regulates returns.

This illustrates a field of tobacco undergoing the laying-by process, the final work of "scraping up," and topping, as this latter work was formerly done when both operations were performed together and by the same "hands," i. e., laborers. Now the "hoe-hands" only perform the hoe work, and topping is done by the most expert on the farm in executing this important work. The toppers now never carry a hoe in their hands, but go right along the rows, carrying two at a time, pinching out the buds in the process of topping with both hands.

Many devices have been resorted to in order to lessen the number and mitigate the ravages of the horn-worm, but the lack of general and continued efforts

from year to year has brought only partial relief. Some years they come in great numbers, and, despite the best efforts of the planter, seriously damage his crop. Perhaps the next year they are few, and give him no trouble. It is the nature of this insect to raise at least two broods during the year. The hawk-moth or tobacco-fly usually makes his appearance in Virginia in the month of May. The eggs deposited by the first moths hatch out in from five to seven days larvæ or worms. The worm sheds its outer skin twice before it gets its growth. The growing stage of the worm lasts from twenty-five to thirty days, and after it has attained its growth it gorges itself a few days longer, and then crawls or burrows into the ground, where it soon passes into the pupa state; and after some twenty-three or twenty-five days from the time of its crawling into the ground the pupa sends forth a moth to lay more eggs and hatch out more worms. Each moth is capable of laying on an average two hundred eggs. So that for every moth in May we may reasonably expect at least one hundred worms of the first brood; and if none of these are destroyed, but all allowed to change to moths, and these latter to raise a horde of worms, what wonder that the second brood sometimes appears in such countless numbers as to defy all efforts to destroy them before they have ruined the crop. Every moth ought to be destroyed as they appear, and this may be done to great extent by injecting a few drops of sweetened Cobalt (which is a poison) into the flowers of the Petunia, Honeysuckle, or Jamestown (Jimpson) weed, which will give them their final quietus. But this hunt for the moth is not general, and if it were some would escape. But if every planter would wage a war of extermination on the first brood of worms—unfortunately a thing rarely done—they would never appear in such unconquerable hordes later in the season. The suckers should be pulled off every week as they appear, and ought never to be permitted to get over two inches long; for, if permitted to grow large they abstract much that would otherwise go to perfect a rich, silky leaf. No planter need expect a crop of fine grade who does not pull off the suckers while small, and prevent the horn-worms from riddling the leaves.

RIPENING.

The leaf type, as contra-distinguished from cigar tobacco, is known to be ripe when its color changes from green to a greenish yellow, thickens, so that when the leaf is folded over—the under surface being outward—and pressed between the thumb and finger it cracks open. The upper surface of the leaf is roughened, for reasons stated under Science of Curing Yellow Tobacco, and generally of a mottled yellow and green color. Ripening of this type usually takes place in Virginia and North Carolina in about five to six weeks after the plants have been topped, sometimes longer when growth has been retarded by drought. The cigar type ripens about two weeks sooner after topping.

[NOTE.—Mr. S. P. Carr, of the tobacco commission firm of Carr & Dickinsons, Richmond, Virginia, and by the way one of the best-posted tobacco men engaged in the tobacco industry, writing to the "Western Tobacco Journal," gives the following advice and information in regard to the best stage in which to harvest tobacco:]

Just as granulation reaches its maximum, if the weather continues open and cool, as is most likely at cutting time, the stalk ceases to pump nourishing plant

food from the soil into the leaf, since the leaf is full beyond its capacity to take more. Slow decadence of the stalk's vitality now sets in, and, following the economic law of nature, it begins at once to return to the soil, by capillary absorption, the surplus elements not needed to mature seed for the perpetuation of its kind. If there are no seeds to fill, as in topped tobacco, it sends up the requisite nourishment through its instincts for that purpose, and then begins to slowly absorb the filling of the leaf, and belting the main stem and laterals as described above.

The same rule applies to the cutting of tobacco that applies to the cutting of clover, hay and timothy, or any other kind of provender. If the grasses are cut over-ripe, or after reabsorption has returned the oils and albuminoids to mother earth, they cure up woody and lifeless, and are rejected by stock of all kinds. If cut while in the flower, when all the plant cells are surcharged with saccharine and other constituents belonging to their nature, they are fixed by curing, and are soft, waxy, flavory, and sweet, making foods of the highest standard of their kind. Wheat, oats, corn, and other grains suffer deterioration from over-ripeness or remaining too long unharvested, as every farmer knows.

CUT-WORMS AND BUD-WORMS.

The cut-worms are troublesome only during the early stages of plant-growth, when they crawl from the ground during the night and cut off or devour the small plants. Clover lands and such as have borne a heavy crop of weeds the year previous are the favorite haunts of the cut-worm. On such, it is sometimes almost impossible to get a stand owing to the extensive depredations from this nocturnal insect. No remedy has been found, except to hunt diligently for every marauder and kill him on the spot.

The bud-worm, so called from its habit of selecting the buds of the plants to feast upon, while scarcely so numerous as the species heretofore described, inflicts for their numbers more damage than the horn-worm, because they eat the small tender leaves full of holes and utterly ruin them—a small worm destroying often more than half the leaves on the plant. Like the cut-worm, the bud-worm must be searched for and killed—being easier found, as his lurking place is always in the bud.

A field where worming and suckering are going on; turkeys are seen assisting in the former process, for they are expert worm-catchers.

CUTTING AND HOUSING.

Do not be in a hurry to begin cutting your tobacco until it is ripe, and enough fully and uniformly ripe to fill a barn. A thin butcher or shoe-knife, well-sharpened, and wrapped with a soft cloth around the handle and extending an inch along the blade, will do the work effectually and be easy to the hand. Try it. Put knives into the hands of experienced cutters only, men who know ripe tobacco, and will select plants uniform in color and texture, and will cut no other. Have your sticks already in the field, and placed in piles convenient—sticking a stick vertically in the ground over each pile that they may be more easily found when wanted. Pine sticks, rived three-fourths of an inch by one and one-fourth inches, and four and one-half feet long, drawn smooth, are best.

Cutting and sticking, as once the almost invariable practice in the Southern Tobacco States, but now only to be seen where the dark export type is raised. The bright yellow and sweet filler types are now usually hung as above described and not permitted to touch the ground.

Start together two cutters and one stick-holder—the cutters carrying two rows, and the stick-holder walking between them. The cutter takes hold of the plant with his left hand at the top near where the knife enters the stalk; with his right he splits the stalk down the centre (observing to guide the knife so as not to sever the leaves) to within three inches of the point he intends to sever the stalk from the hill; and as the knife descends his left hand follows the slit or opening, and when the plant is severed from the hill, by a dexterous movement of the left hand the plant is straddled across the stick in the hands of the holder. When the stick has received about six medium plants, if intended for brights, it is ready to go to the barn, either carried by hand if near, or hauled on a wagon if distant. If it is necessary to use the wagon, prepare a bed sixteen feet long to hold three coops on piles, on which place tobacco as cut, and after placing twenty-five or thirty sticks of cut tobacco on each coop, drive to the barn to be unloaded.

Tobacco suitable for brights is best handled in this way, as it is bruised less than if handled by any other mode. Try it, planters, and know for yourselves. Very heavy tobacco will break less if, after being cut by the above mode, the

sticks are placed gently on the ground and the plants allowed to wilt before being removed to the barn. But tobacco of medium size bruises less to handle it without wilting. Cutting and housing by this mode you never have any sun-burned tobacco. For brights, it has been found best to commence curing at once, as soon as the barn can be filled

SUN-CURED TOBACCO.

Just here it may be well to give our practice in sun-curing. If the crop is too rich and coarse for brights, then it may be good policy to cure it sweet. To do this properly, erect scaffolds at or near the barns, on which place the tobacco as soon as cut. But some, in order to obviate the hauling of heavy green tobacco, place the scaffolds in or near the tobacco field. But it is never safe to scaffold tobacco away from the barn; for after the leaf is partially dry it ought never to be caught out in the rain; which may happen if tobacco is placed on scaffolds away from the barn. When rain threatens, that on scaffolds near the barn may very soon be placed out of danger, but not so that on scaffolds afar off

CURING SWEET FILLERS WITH FLUES.

To cure fillers with flues, when the tobacco is placed in the barn as soon as cut, raise the heat in the barn to eighty-five or ninety degrees Fahrenheit, and then go about other business. Kindle fires in the flues every morning, raising the heat to ninety degrees, and then leave as before, and continue to do this for four or five days until the tobacco is thoroughly yellowed. If the tobacco has much sap, it may be necessary to continue the yellowing process from five to seven days to yellow properly. After this very little flue heat will be necessary to dry out the tobacco. If rains occur before the tobacco is thoroughly cured, raise fires in the flues and dry the leaf, as often as may be necessary.

TO CURE MAHOGANY COLOR.

After the tobacco has yellowed sufficiently on scaffolds or under flues, and when the leaves have assumed a mottled, piebald appearance, run the heat to one hundred degrees and let it remain at that point for three or four hours. Then raise the heat two and a half degrees an hour until one hundred and thirty is reached. Keep the heat at this point until the leaf is cured, and then move up gradually to one hundred and sixty or one hundred and seventy, and thus cure stalk and stem. If cured properly there will be much of the leaf mahogany, while the remainder will run from a bright dapple to a cherry red.

SHIPPING TOBACCO.

Dark heavy shipping—and nothing which does not possess size and substance is fit for this grade—may be cured with flues better than in any other way. Smoke from the open wood fire is objectionable, and with the flue you get the heat, which is all that is wanted, without the smoke. Curing with open wood fires belongs to the past, and none but the old Bourbons will continue the old practice, because they know no better. Taste and fashion are against smoke, and nothing else is needed to banish the old and recommend the new mode. If a

dark color is desired, which is not so fashionable as formerly, it can be secured as easily over flues as over wood fires. But the world wants colory tobacco, and this can be produced certainly better with the flue than in any other way. Besides by the flue the leaf is cured sweet and free from smoke or soot.

A skillful curer can produce the colors most in demand, and by the flue better and with more certainty than in any other way. The main object of the author is to induce planters, who have never used flues, to try them for all grades.

Housing the dark shipping type to be cured by open wood fires; the practice of generations until the development of other types and newer and better methods.

CURING BRIGHT YELLOW TOBACCO.

There are two modes for curing yellow tobacco—one with charcoal and the other with flues. The first is the primitive mode, but is fast giving place to the latter, which is cheaper and more efficient, and is being adopted by most of our best planters. The chief agent in either mode is heat—a dry, curing heat—to expel the sap from the leaves, stems, and stalks of the plants, and catch the color, yellow, next to nature's color, green, and to fix it indelibly. This is the science of curing yellow tobacco. There are seven prismatic colors—that of green tobacco occupying the middle of the prism. By the process of nature, leaves in drying descend in color from green, first to yellow, then orange, then red, and finally lose all color as they go to decay. Now, a quick dry heat, so regulated as to dry out the leaf and catch the yellow, and fix it, is the modus operandi of curing fancy bright tobacco.

A barn containing seven hundred sticks of green tobacco, six medium plants on each stick, holds along with the tobacco four thousand five hundred to five thousand pounds of water, which must be expelled in from eighty-five to one hundred hours.

Charcoal produces an open, dry heat, well suited for the purpose; but its preparation is costly, its use tedious, dirty and laborious, and it deposits a black dust on the leaf that is objectionable. With flues (see diagrams) constructed with

furnace and pipes, the wood is burned as cut in the forest or old field, and the whole process of curing is less costly and less laborious, and the tobacco cured therewith free from dust, and has a sweeter flavor. The flue process possesses so many advantages over all other modes of curing tobacco, is so safe, if properly constructed, and free from smoke, that when its merits become better known it will come into general use and supersede all other modes.

The first step in curing is called the steaming or yellowing process. Medium tobacco will require from twenty-four to thirty hours' steaming at about ninety degrees to yellow sufficiently; but tobacco with more or less sap, larger or smaller, will require a longer or shorter time to yellow. Here the judgment of the curer must be his guide. Inexperienced planters would do well to procure the services of an expert curer, if they have tobacco suitable for fine yellow. The planter saves in enhanced value of his crop many times the money paid to the curer, and, besides, by close attention, he may learn in one season to cure well himself. Theory alone, however good, and directions, however minute, will not do here, but it is practice that must qualify one to cure well.

When it is remembered that no two plants are exactly alike, no two barns precisely similar in every particular, and that the weather may change every hour, is it reasonable that a fixed programme can be followed for every curing with any certain hope of success? The experienced know better. On work so variable, only general directions can be given. The planter here must use his head as well.

The next step is called fixing the color. When the tobacco is sufficiently yellowed, best leaves of a uniform yellow, and the greener ones of a light pea-green color, it is time to advance the heat to one hundred degrees; observing the leaves closely to detect sweating, which will soon redden and spoil the color, unless driven off. To do this, open the door and let it stand open, and if after an hour or more the sweat has not disappeared, open a space between the logs on opposite sides of the barn to let in more air, and permit it to remain open until the tobacco has dried off all appearance of the sweat. To dry off the sweat speedily, sprinkle dry straw or hay over the floor and set fire thereto, using just enough straw to accomplish the desired result. Right at this point more curings are spoiled than at any other stage of the process. It may be well to remember what is a fact, that at least five curings are spoiled by proceeding too fast, to one failure from going too slow. Now stick a pin here.

But to go back to the barn, where we have just dried the leaf, and where the thermometer indicates a fall of five or ten degrees—but this need not concern the curer to put him out of hope, for a little cooling under the circumstances was necessary—we close up the opening and raise the heat to one hundred degrees. But a skillful curer detects the first indications of sweat, and prevents it by regulating the heat and ventilation.

Keep the heat at one hundred degrees for four hours, and then advance two and a half degrees every two hours, until one hundred and ten degrees are reached. Here you have reached the most critical point in the difficult process of curing bright tobacco. The condition and appearance of the tobacco must now be the curer's guide. No one can successfully cure tobacco until he can distinguish the effects of too much or too little heat in the appearance of the leaf. Too little heat, in fixing the color, operates to stain the face side of the leaf a dull brown color, and is called "sponging," and may be known to the novice by

its appearance only on the face side of the leaf. Too much heat reddens the leaf, first around the edge and then in spots, which are visible on both sides. Now, to prevent sponging on the one hand and spotting on the other, is the aim of the experienced curer. No definite time can be laid down to run from one hundred and ten to one hundred and twenty degrees. Sometimes four hours will suffice, then again eight hours is fast enough. While it is usual at this stage to advance about five degrees every two hours for medium tobacco, the condition of the tobacco often indicates, to the practiced eye, the necessity for slower or faster movement. But it is safe not to advance above one hundred and ten degrees until the tails begin to curl up at the ends. Arrived at one hundred and twenty or one hundred and twenty-five degrees, this is the curing process. The heat should remain at or near these figures until the leaf is cured, which will require from six to eight hours, according to the amount of sap in the leaf to be expelled. When the leaf appears to be cured, advance five degrees every hour up to one hundred and seventy degrees and remain until stalk and stem are thoroughly cured. To run above one hundred and eighty degrees is to endanger scorching the tobacco, and perhaps burning both barn and tobacco.

To recapitulate—

First. Yellowing process, 90 degrees from 24 to 30 hours.
Second. Fixing color, 100 degrees, 4 hours.
" " " 100 to 110, 2½ degrees every 2 hours.
" " " 110 to 120, 4 to 8 hours.
Third. Curing the leaf, 120 to 125, 6 to 8 hours.
Fourth. Curing stalk and stem, 125 to 170, 5 degrees an hour.

And continue at one hundred and seventy degrees until stalk and stem are thoroughly killed and dry, which usually requires from twelve to fifteen hours.

THE NEW METHOD OF CURING.

The curing process for yellow tobacco, as heretofore laid down, was first published in the year 1871, and was the first systematic treatise given to the public on the difficult art of curing yellow tobacco; and it has remained substantially unaltered through six editions of the pamphlet, aggregating largely over 100,000 copies. Thousands in several States have taken it for their guide, and been enabled to learn to cure successfully, without any other assistance. But the yellow tobacco industry has greatly progressed and extended during the past decade, and new light has come through experience to further perfect the art of curing.

The following is given as the latest improvements in curing tobacco:

House the tobacco as soon as cut, and after warming up the barn for two or three hours at a temperature of about 90 degrees, advance the heat rapidly up to 125 degrees, or as high as it will bear without scalding the tobacco, letting the heat remain at 125 degrees only a few minutes, and then, by drawing the fires and turning the dampers, cut off the heat and let the temperature of the barn descend to 90 degrees.

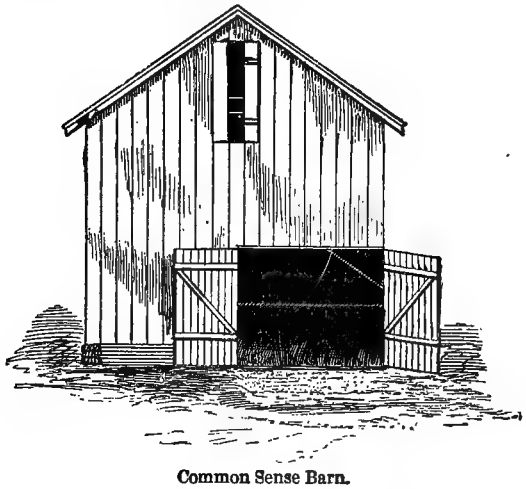
This is generally called "sapping." The rationale of the process is this: The hea by expansion, opens the sap cells and starts the water to the surface, facilitates evaporation and hastens the yellowing process.

This "limbering up" process, of high heat at the start, must be of short duration, or else great injury will be done to the tobacco.

Following this mode the yellowing process is greatly shortened, requiring from four to eight hours less to yellow sufficiently, and also hastens the second stage of curing, fixing the color.

It is well to state that there is so great a difference in the character of tobacco grown in different localities that no rule can be given for the yellowing process applicable to all. The tobacco of Middle and Western North Carolina will yellow in much less time than that grown in Middle Virginia. Then, again, tobacco will bear higher temperature in the yellowing process during some years than in others. Notably, the season of 1884 was so dry, and tobacco held so little sap when ripe, that many commenced yellowing at 100 degrees, and had the leaf cured in fifty hours. But this is exceptional, and for general practice would spoil both color and tobacco.

The season, therefore, it must be borne in mind, greatly determines the amount of heat the tobacco will require to be yellowed and cured.



Common Sense Barn.

Some of the patented flues are so constructed that the heat is easily controlled, and the tobacco smoked or steamed, or both, as may be necessary in the yellowing stage. Some tobacco will require neither to yellow right, while some other will dry up green or red without yellowing, if smoke or steam be not used to assist the yellowing process. Smoke or steam will facilitate the yellowing of thin poor tobacco holding very little sap. Wetting the barn floor from time to time will assist in yellowing tobacco. Then there is an occasional barn of tobacco that defies all the known modes and appliances to yellow or cure bright.

But for all practical purposes, whenever the curer has mastered a knowledge of the effects of too much or too little heat, as evidenced in the color of the tobacco, clearly described heretofore, he possesses a key to solve the difficult problem in the science of curing tobacco. By close observation this lesson may soon be learned, and then success is easy.

After curing, as soon as the tobacco is sufficiently soft to move, you may run it up in the roof of the barn and crowd it close, or if the barn is needed for other curings, the tobacco may be carried to the storage barn or bulked down in any dry house on the premises. But be sure that nothing is bulked with green stalks or swelled stems, for if such are placed down in bulk it will be sure to heat and utterly ruin.

THE SCIENCE OF CURING YELLOW TOBACCO.

The first step in explaining the process is to give in outline the chemical constituents of green tobacco.

Besides its inorganic (mineral) elements—lime, potash, soda, magnesia, alumina, ferric oxide, phosphorous, sulphur, chlorine, and silica—it contains the following organic substances: starch, glucose, albuminoids, resinous and fatty compounds and the vegetable acids, pectic, citric, malic, oxalic, and acetic. And of the combinations of organic elements there are found in tobacco nicotine, nicotianine, celluloid, and chlorophyl.

RIPENING OF TOBACCO.

After the plant has attained its full growth, the leaves cease to expand and "granulation, due to the distention of the individual cells of the leaf through accumulation of inter-cellular substance begins," which in North Carolina and Virginia usually takes place from five to six weeks after topping, hastened or retarded, according to season, soil, and time of planting. Then, if the weather is dry and favorable for a few days longer, the color changes rapidly from green to a pale yellowish green, as the plants get ready for the knife. The main cause of the change in the color of the leaves is due to the chlorophyl—the coloring matter in leaves—being changed to xanthrophyl.

CHANGES IN TOBACCO INDUCED BY FLUE CURING.

The temperature of 90 to 100° Fahr. continued for 30 to 36 hours under the tobacco, induces slight fermentation, expands the leaf cells and starts the sap to the surface, when evaporation commences in earnest. The vegetable acids, acting on the starch, glucose and albuminoids, produce at first slight fermentation —somewhat after the ripening of an apple or pear, and causes a change of color in the leaf, superinduced by the same reasons or agencies which induce change in the color of a ripening apple or pear.

In the chemical changes produced in the incipient curing stages—the yellowing of the leaves—sugar is formed, ammonia evolved and chlorophyl changed into xanthyne. Now, if the temperature is raised slowly at this stage of the drying process, so as not to oxidize the organic properties in the leaf, the color is preserved till the leaf is dried. But a too rapidly advancing temperature causes oxidation and discoloring, or rather reddening of the leaf, sometimes to the extent of scalding—virtually cooking it. And so, if the heat is not properly advanced and adjusted and fermentation too long continued, the yellow color fades into brown. To so regulate the color by heat as to catch and fix it in the leaf while sap is being expelled and the leaf dried, is the science of curing yellow tobacco.

What is termed "sweating" during the curing process is the accumulation of sap, driven by the heat to the surface of the leaves more rapidly than the ventilation will enable the hot dry air to absorb. And whenever this condition occurs, the experienced curer knows it results from inadequate or imperfect ventilation. For, whenever the ventilation is properly adjusted, there will be no sweating—the current of warm or hot dry air induced by the draft will take up—absorb—the moisture thrown to the surface as fast as it is evolved. "Sponging" is produced by oxidation caused by fermentation too long continued, and indicates the incipient stage of what is called "house-burn," "pole-sweat," or "barn-rot." Proper ventilation as well as heat, is necessary to so dry the leaf without sweating or

sponging, as to catch and fix the yellow color. Tobacco cured with a slight green color, which disappears before it is sent to market, is the fashionable color for fancy stock.

STRIPPING AND ASSORTING.

Tobacco should never be stripped from the stalks except in pliable order, and the leaves on every plant should be carefully assorted, and every grade tied up separately. Usually there will be three grades of leaf, assorted with reference to color and size, and two of lugs. Of leaf tie six to eight leaves in a bundle, and of lugs eight to ten. As fast as you strip, either hang the "hands" on sticks—twenty-five to each stick and hang up or bulk down in two layers, the heads of bands or bundles facing outward. The latter mode is best, if you intend to sell in winter order loose, on the warehouse floors. If bulked down watch frequently to see that it does not heat. If the bulk becomes warm it must be broken up, aired and rebulked, or hung up if too soft. It is safer always to hang up as soon as stripped, unless you design to sell soon, and strike down in "safe-keeping order" in spring or summer. It is considered in "safe order" when the leaf is pliable, and the stem will crack half way down the tie.

This illustrates the antiquated mode of stripping and tying tobacco, where the "head-man" assorted, and women and children performed the work of tying the leaves in bundles or bands, out of doors. This work is now much more carefully and nicely done in doors—usually in a stripping-room specially constructed for the purpose, with glass windows to afford sufficient light to execute the work properly.

DON'T SPOIL TOBACCO AFTER IT IS CURED.

If the temperature is raised above 160 degrees—and for some tobacco above 150—much of the vegetable oil is expelled, and therefore the "life" of the tobacco killed and thereby seriously damaged in other respects—evolving and fixing in the leaves ammonia and acids which bite the tongue and injure the flavor.

The unscientific planter may know nothing of the chemical constituents of tobacco, or the rationale of the effects of heat in inducing a pale green color in the leaf, or why heat and evaporation properly adjusted prevent oxidizing and

reddening thereof, or that induces sweating and sponging and wherefore; but every one who reads this short monograph will the better understand why the changes and metamorphoses do occur and the reasons therefor.

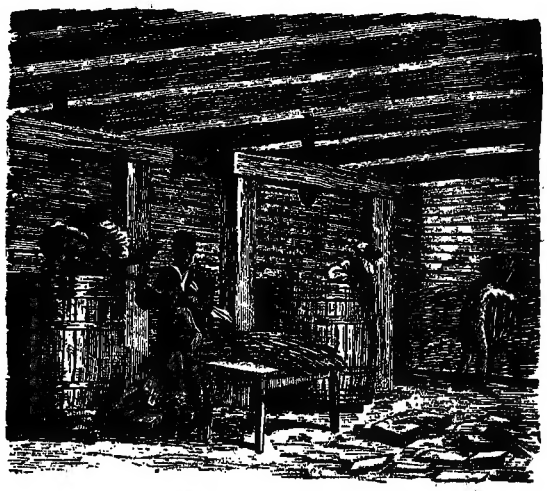
ORDERING.

If, after the tobacco is cured, the weather remains dry and it fails to get soft readily, so that it can be moved, it may be brought in order in the following way: Place green bushes with the leaves on over the floor and sprinkle water over them copiously; if the tobacco is very dry and the atmosphere contains but little moisture, and if the weather is cool, a little fire kindled in the flues will assist in making the tobacco soft. Straw, wet or made so, will answer the same purpose. If the weather is damp, there will be no necessity to use either straw, brush or water. But when it is necessary to use any means to order tobacco, it is best to apply them in the afternoon, that the tobacco may be removed the next morning.

If the weather continues warm and damp or rainy, tobacco that remains hanging will be apt to change color, unless dried out by flues or charcoal. When this becomes necessary, build small fires at first, and raise the heat gradually.

PACKING.

If you sell loose, deliver in large uniform piles—such will cost less, and your tobacco bring more in price. But to sell in a distant market, pack in tierces—half hogsheads make the best and cheapest—to weigh about four hundred pounds net, taking care not to press the tobacco so as to bruise it, or pack it too closely together. The best leaf is wanted for wrappers, and it must open easily when shaken in the hand. Pack one grade only in each tierce, uniform in color and length; but if it becomes necessary to put more than one grade in a tierce, place strips of paper or straw between to mark and separate them. Pack honestly, for honesty is always the best policy. The man who "nests" his tobacco will certainly go on the "Black List," and buyers have good memories.



This cut illustrates the work of packing and prizing into hogsheads for market, except there is wanting in the picture a girl or boy extra to each packer, to handle the tobacco as it goes into the packer's hands. The manufacturing types are largely sold loose in piles on the warehouse floors, where the tobacco is delivered in planter's wagons. If sent by rail, it is loosely packed and prized lightly, if at all.

FERTILIZERS ON TOBACCO.

In 1890 Major R. L. Ragland, of Halifax county, the well-known authority on tobacco, conducted for the Virginia Experiment Station, in conformity with the plan furnished him by Col. W. B. Preston, who was then in charge as Director, a series of experiments with fertilizers on tobacco. The report of the results was submitted in 1891. The tests were accurately and intelligently made, and the report gave evidence of such careful preparation as to merit high commendation. It is herewith given, in a condensed form, and with some unimportant changes. The results reached are interesting and suggestive, and accord with the experience of others as to the superiority of organic forms of nitrogen. Storer, for example, remarks: "A successful grower of tobacco has informed me that he gets a better flavored leaf when he manures with fish scrap, flesh, or blood, than when he uses nitrates or ammonium salts."

Major Ragland's observations on the effects of dried blood and nitrate of soda as preventives of field fire, and the effects of fertilizers in preventing to a large extent the "stalk rot," are very valuable, and should command the attention of tobacco growers.

J. M. McBRYDE, Director.

Virginia Experiment Station.

REPORT.

The tests were intended to ascertain the effects of nitrogen, phosphoric acid, and potash on the yield and quality of tobacco, and the form or forms in which nitrogen can be best applied on this crop.

Every application contained the same amounts of potash and phosphoric acid, and pratically the same amount of nitrogen, but in different forms, thus giving at the same time all the fertilizing constituents required and full effect to the nitrogen employed.

Soil.—The tests occupied six plats of one acre each, contiguous to one another, and as nearly alike as possible in exposure, situation, physical condition, and fertility. The field selected was typical yellow tobacco land, only one year from the forest, on which tobacco had been cultivated the preceding year. A sample of this soil, analyzed by Prof. Walker Bowman, formerly Chemist to the Station, gave as follows:

AIR-DRIED SOIL.

Moisture	.577
Organic Matter	2.982
Phosphoric Acid, P_2O_5	.019
Lime	.076
Ferric Oxide and Alumina	1.550
Magnesia	.036
Potash	.019
Soda	.038
Nitrogen	.090

Commenting upon the analysis, Prof. Bowman remarked: "The soil is remarkable for the small amount of mineral matters which it gives up to acids. Judging from the foregoing figures, it would undoubtedly for ordinary farm crops, such as wheat, corn, oats, etc., be called poor. It is a matter of interest, however, to determine to what extent its favorable physical properties and climatic surroundings, together with the application of suitable fertilizers, will render it a good soil for the growth of tobacco.

"It appears to be of easy tilth and drainage, and of fair, but not very great, water-holding capacity."

The plats were carefully surveyed and staked off by an assistant of the Virginia Agricultural Experiment Station. The land was well prepared by several plowings and harrowings during the winter and spring. The fertilizers were applied by sowing half the quantity allowed each plat broadcast, and by drilling in the remainder. The tobacco, Long Leaf Gooch, was planted 3½ feet by 3 feet on May 28th.

Thorough cultivation was given throughout the season. It is scarcely necessary to add that all the plats received exactly the same treatment, except in the matter of fertilization. An almost perfect stand was secured. The first tobacco was cut September 5, the last September 20th. At each cutting 100 selected sticks were taken from each of the fertilized plats and placed in one room of a barn containing five rooms, so as to keep the product of each plat separate, in order to give all the same treatment in the barning and curing.

The tobacco on the unfertilized plat, No. 6, ripened from ten days to two weeks later than that grown on manured plats, showing that fertilizers hasten the maturity of tobacco to that extent.

The year 1890 was favorable to tobacco. Somewhat too much rain fell during the growing season, but the rains ceased in a measure after July, and the weather during August and September proved exceptionally favorable to the barning and curing of the crop. A full crop, over the average in quality, was in consequence obtained.

The details of the experiments are given in Tables I and II. Table No. I shows the kinds and amounts of fertilizers applied on each plat, and the weight and value of the various grades of tobacco from it.

It was observed on July 14th that the manured plats were beginning to grain, and that the color of No. 3 was decidely the yellowest—a difference which was maintained throughout. The product of this plat also showed up brighter when cured.

In comparison with Nos. 1, 2, 3, 4 and 5, it appears that the unmanured plat gave the poorest returns.

Of the nitrogenous fertilizers used, the dried blood gave the largest yield, and also the largest financial returns.

The yield and value of the crops of plats Nos 1 and 2 were nearly alike, and while the yield of No. 4 was less than that of either of the others its value was slightly greater than that of No. 2, and but little under that of No. 1.

In weight and value, the crop of No. 5 was the lowest of any of the fertilized plats. The tobacco on this plat suffered more from field-fire than any of the others. This injured the yield and reduced its value. There was some field-fire on plat No. 1, on which less sulphate of ammonia was used.

Dried blood gave good results on the three plats on which it was used, and where combined with nitrate of soda, in plat No. 2, the results were also good. This plat, unlike Nos. 5 and 2, showed no field-fire.

Where dried blood and nitrate of soda were used, in combination or separately, there was scarcely any field-fire—much less than where no fertilizers were applied.

There was also more stalk-rot (called by some planters "hollow stalk") on the unmanured plat than on all the fertilized plats put together. This is suggestive. If verified by future tests, it will point planters to the remedy.

The results of the tests, to sum up, appear to indicate that nitrogen was most effective in the form of dried blood, and that the nitrogen of nitrate of soda was more available than that of sulphate of ammonia.

Also, that fertilizers can be made to pay, and pay well, if compounded of materials suited to the tobacco crop, and adapted to the thin silicious soils of Middle Virginia.

TABLE I.—EFFECTS OF DIFFERENT FERTILIZERS ON TOBACCO.

No. of Plats.	Kinds and amounts of Fertilizers per Acre.	Yield of the various Grades of Tobacco in Lbs.																	
		Best Leaf.		Value.		Second Leaf.		Value.		Third Leaf.		Value.		Best Lugs.		Value.		Second Lugs.		Value.		Total Produce.		Aggregate Value.	
		lbs.	lbs.	$	c.	lbs.		$	c.	lbs.		$	c.	lbs.		$	c.	lbs.		$	c.	lbs.		$	c.
1	Sulphate of Ammonia 50 Dried Blood 50 Sulphate of Potash 120 Acid Phosphate 114	105	105	29	40	367	253	35	05	130	156	13	00	135	115	12	15	298	354	25	60	1035	1013	131	20
2	Nitrate of Soda 72 Dried Blood 80 Sulphate of Potash 120 Acid Phosphate 114	105	105	29	40	253	253	40	48	166	166	22	32	115	115	10	92	354	354	24	78	1013	1013	127	90
3	Dried Blood 160 Sulphate of Potash 140 Acid Phosphate 114	170	170	42	50	363	363	58	08	112	112	12	32	121	121	12	70	280	280	21	00	1046	1046	146	60
4	Nitrate of Soda 143 Sulphate of Potash 120 Acid Phosphate 114	127	127	33	65	278	278	48	96	123	123	13	53	140	140	14	00	250	250	20	00	946	946	130	14
5	Sulphate of Ammonia 100 Sulphate of Potash 120 Acid Phosphate 114	100	100	27	00	289	289	40	35	160	160	14	40	94	94	9	40	267	267	18	48	887	887	109	63
6	Unfertilized	44	44	9	68	240	240	33	60	66	66	7	26	132	132	15	84	280	280	19	60	762	762	85	98

Table No. II gives in detail the financial results of the several tests.

TABLE II. FINANCIAL RESULTS OF TESTS.

No. of Plat.	Fertilizers Used.	Cost of Fertilizers Per Acre	Value of Tobacco Per Acre.	Value of Incres'd Yield Per Acre.	Profit Per Acre.
1	Sulphate of Ammonia Dried Blood Sulphate of Potash Acid Phosphate	$8 25	$131 20	$45 22	$36 97
2	Nitrate of Soda Dried Blood Sulphate of Potash Acid Phosphate	8 25	127 90	41 92	33 67
3	Dried Blood Sulphate of Potash Acid Phosphate	8 25	146 60	60 62	52 37
4	Nitrate of Soda Sulphate of Potash Acid Phosphate	8 25	130 14	44 16	35 91
5	Sulphate of Ammonia Sulphate of Potash Acid Phosphate	8 25	109 63	23 65	15 40
6	No Fertilizer	.....	85 98	.....	.....